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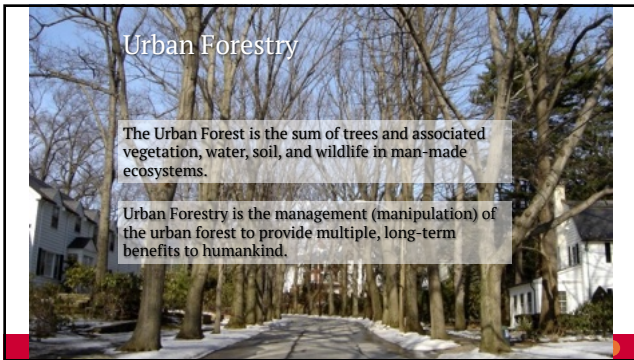
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So you are going to prune

- There must be a purpose
- Is this about a poor species choice?
- You are purposefully wounding a tree, what does that imply?



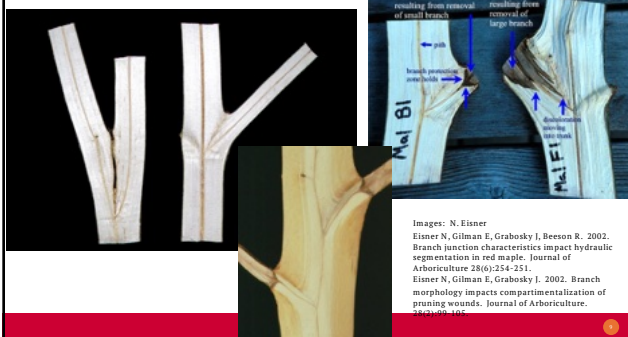
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Pruning is wounding: CODIT in a nutshell

- Inside the tree in normal times, there is little/no free oxygen
- Pruning introduces open wounds for oxygen ingress
- As a wound, the tree (in N. America) is modeled in response by a concept called
- Compartmentalization of Decay in Trees, or CODIT (and it is often misunderstood)
- The model describes walls, the reality is a set of shifting zones
- The Model uses existing wood organization to help make interpretation points

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Compartmentation versus Compartmentalization



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First, there is an inspection

- This is a more or less formal step, but critical in the process
- What is it?
- Why are you considering pruning (the values and needs in play)?
- Plant condition/current architecture/"health"
- Definition of what types of branches to reduce or remove///location of said branches
- Understanding//defining the amount to prune (numbers diameters or percentages)
- What cuts or techniques are in play (reduction/removal/heading or shearing cuts)?
- What is impacted beyond the tree (environmental changes, wildlife/habitat)?
- Safety safety safety safety

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**You work within a pruning system....
you work with defined objectives**

• Natural

- *Topiary*
- *Pollard*
- *Espalier*
- *Pleach*
- Fruit production
- Bonsai



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Gratuitous pretty pruning Imago



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Topiary systems are an intensive pruning system

Examples span from simple geometric forms to more complicated artistic interpretations of form or subject

In this sense, Christmas tree growers with heavy shear product would be a form of topiary in an orchard system

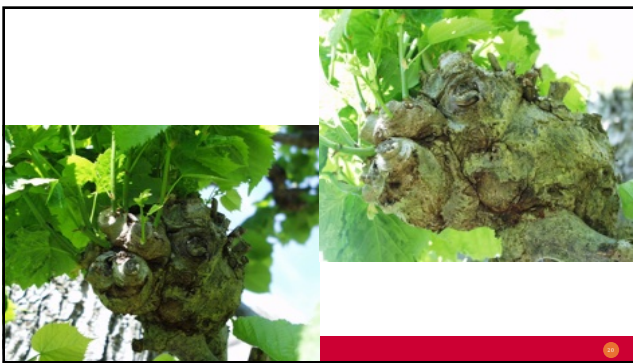
It takes a long time to grow a good mouse



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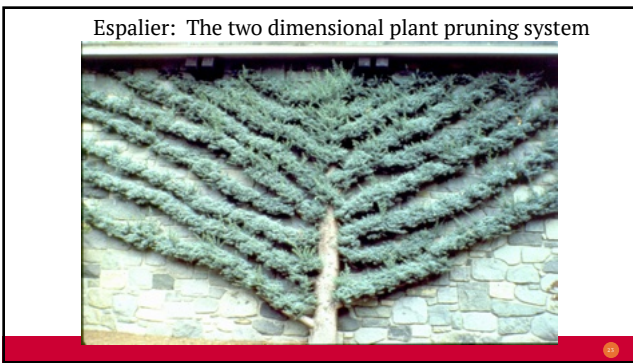
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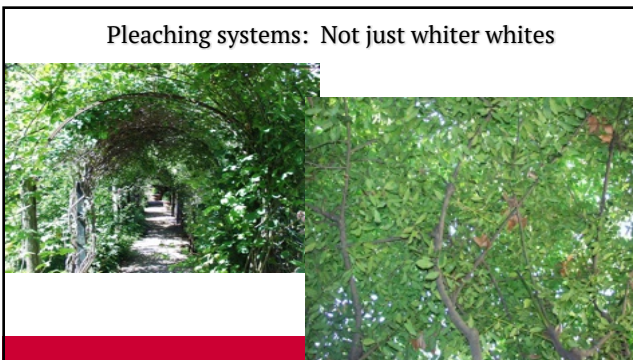
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Fruit Production pruning systems are already due for a name change..... orchard systems, food production systems?

Espalier - Growing Produce
Orchard traditional: Biography.com
Old orchard: gardenerspath.com
themaplenews.com

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Word press
homestratosphere.com
Penjing image : Long Journey Channel

Bonsai as a pruning system:
A meditation on hormone
flux and balance within a
pruning action

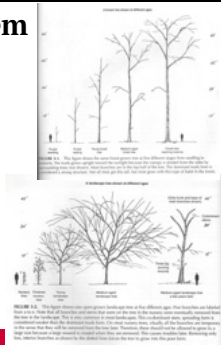
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- Reduction cut
- Removal cut
- Heading Cut
- Clipping

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The "natural" system

- The vast majority of pruning work
- Attempts to retain the perception of a natural form and organizational balance of the plant while imposing a change (tissue removal) for some specific objective



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PRUNING A PLANT ASSUMES A CLEAR UNDERSTANDING OF THE PLANT'S PURPOSE OR FUNCTION

Pruning Objectives

- Improving Structure
- Risk mitigation
- Clearance
- "Health" maintenance
- Reduce Density
- Restoration
- Size Management
- Shrub pruning //rejuvenation
- Flower or fruit production
- View improvement
- Aesthetic improvement
- Wildlife habitat management



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Images: Ed Gilman

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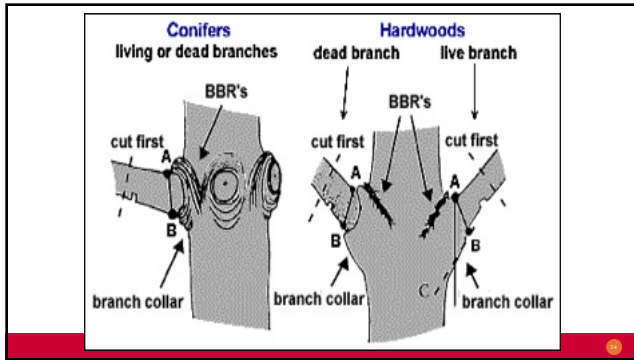
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Top priorities when pruning

- Dead branch removal (over a specified diameter)
- Structural pruning (where appropriate)
- Shorten or remove branches with included bark
- Shorten or remove branches with defects



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Training principles

- The first 3-5 years post-transplant are most crucial
- Pruning should only be enough to redirect growth or correct a structural problem
- Light pruning to no pruning results in the most growth
- Remove only those shoots which are clearly unwanted or competing with the leader. LEAVE THE REST



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Doesn't the tree come trained from the nursery?
That depends on the source of the material

- The market consumer and specification largely determines supplier pruning practice, after cropping schedule impacts. Low "feeder" branches increase caliper, but minimum branch height specification can change best practices



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QUESTIONS?

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QUESTIONS?

So how do you fix this (if you're so smart) ?

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Tree Protection from construction (or events)

- Ephram Felt. 1945. Shelter Trees in War and Peace.
- ANSI A300 Part 5: Tree, Shrub and Other Woody Plant Maintenance - Standard Practices (Management of Trees and Shrubs During Site Planning, Site Development, and Construction)
- Companion Volume: Best Management Practices: Managing Trees During Construction (Third Edition is in your lending library*)
- These are voluntary standards, but can be useful.
 - Defining a scope of services
 - Specification writing to get what you want, or to get bids into common tolerances

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Trees Grow in Response to Their Environment

- Competition, and release from competition
- Grove versus specimen tree morphology
- Growth and adaptation is slower than our ability to change the landscape
- Individual trees and species respond to change differently
- Whole-tree response over time to changes in their environmental surroundings is often directed growth

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Older Trees Require More Space and Less Negotiation

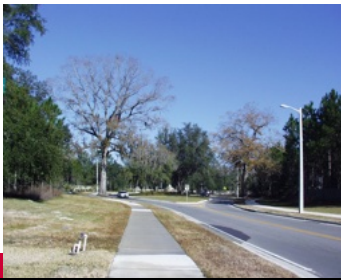
- All protection zone formulae assume larger zones of root influence for larger trees
- As an older tree, it is less able to compensate for stress with directed growth (rate and volume issue)
- Even comparable growth has a diminished impact when comparing small and large tree sections
- If tree failure is like "the death of 1000 cuts", then you're likely tap dancing in the high 900s



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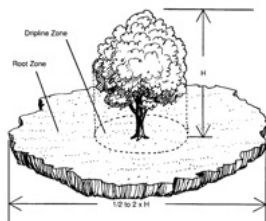
The Name of the Game Is Soil Preservation

- If an appropriate soil zone is preserved, the top of the tree is usually not at risk for contact damage.
- If the tree is under stress, management is a function of root zone integrity.
- Most of the biomass is below ground anyhow.
- Set protection zones rather than individual tree fences to prevent the bumper car effect



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The Root Zone



Soil conditions are usually best near the surface



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So, what do you do? Step one is assess and evaluate

Management report information

A-1.1 Some factors to consider when evaluating suitability for preservation:

A-1.1 Tree health: Healthy, vigorous trees are better able to tolerate impacts such as root injury, disturbance of stability structures, changes in soil grade, and moisture, and are less likely to be lost or damaged than are non-vegetative trees.

A-1.1.1 Site characteristics: The site characteristics and the extent of the site should be considered in relation to the proposed project or activity.

A-1.1.2 Species response: There is a wide variation in the response of individual species to construction impacts and changes in the site.

A-1.1.3 Tree age and size: Young trees are more vulnerable to construction impacts than are mature trees. The extent of the site should be considered in relation to the proposed project or activity.

A-1.1.4 Soil health and stability: The soil health and stability of the site should be considered in relation to the proposed project or activity.

A-1.1.5 Construction impacts: The extent of the site should be considered in relation to the proposed project or activity.

A-1.1.6 Examples of suitability ratings:

A-1.1.6.1 Good: There are trees with good health and structural stability that have the potential for longevity of life.

A-1.1.6.2 Moderate: There is the potential for trees with good health and structural stability that may be affected by construction impacts. There are trees with moderate health and structural stability that may be affected by construction impacts. There are trees with poor health and structural stability that may be affected by construction impacts.

A-1.1.6.3 Poor: There is the potential for trees with poor health and structural stability that may be affected by construction impacts. There are trees with poor health and structural stability that may be affected by construction impacts. There are trees with very poor health and structural stability that may be affected by construction impacts.

A-1.2 The tree management report should include:

1. A list of trees to be preserved, including species, size, and location.
2. A list of trees to be removed, including species, size, and location.
3. A list of trees to be planted, including species, size, and location.
4. A list of trees to be maintained, including species, size, and location.
5. A list of trees to be protected, including species, size, and location.
6. A list of trees to be monitored, including species, size, and location.
7. A list of trees to be replaced, including species, size, and location.
8. A list of trees to be removed, including species, size, and location.
9. A list of trees to be planted, including species, size, and location.
10. A list of trees to be maintained, including species, size, and location.
11. A list of trees to be protected, including species, size, and location.
12. A list of trees to be monitored, including species, size, and location.
13. A list of trees to be replaced, including species, size, and location.

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Get in Early Into the Construction Process... and Stay There

- Pre-development tree care and preparation
- Protection during planning, development and construction
- Post-development care and maintenance

Figure 1: Intersection of College Farm Road and Highway 1 with trees approximately located. Image from Google Earth Download April 13, 2006.

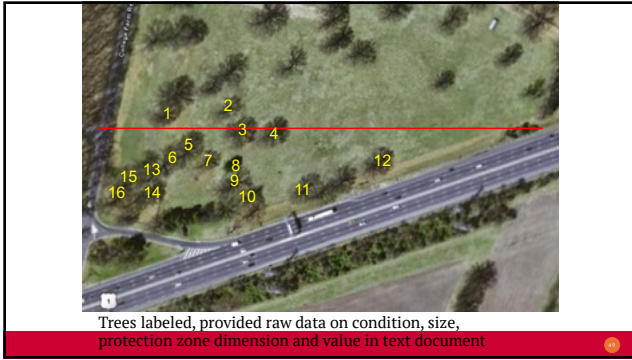
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Inventory

- Identify species within the zone in question
- Measure tree in question (for various protection zone delineation methods, trunk also for relative value appraisal)
 - Height
 - Canopy diameter in 2 directions
 - Trunk diameter at 4.5 feet from ground
- Assess tree condition (for relative value appraisal)
 - Trunk
 - Root flare zone
 - Major branch connections/branches
 - Outer branches

Tree 11: Q. alba 70 ft tall, 68 feet wide, 39 inch dia. trunk

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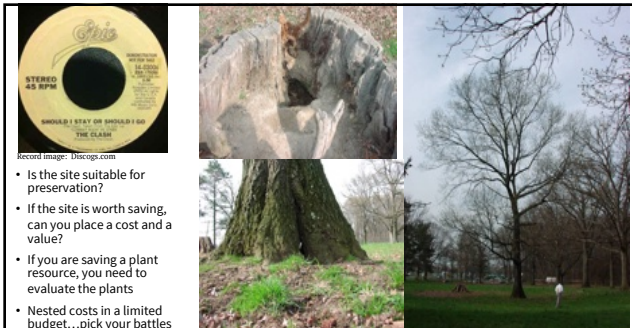


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Site Inventory & Evaluation

- Identify stands of trees and significant planting zones
- Identify ordinance regulations and guidelines
- Current health and structure
- Species general response to stresses
- Value to the site
- Plant age-longevity and vigor
- SULE
- Extent of environmental change (singles versus groups)

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record image: discogs.com

- Is the site suitable for preservation?
- If the site is worth saving, can you place a cost and a value?
- If you are saving a plant resource, you need to evaluate the plants
- Nested costs in a limited budget...pick your battles

Tree 7: *Q. rubra*, 67 ft tall, 55 ft wide, 32 inch dia. trunk: Condemned

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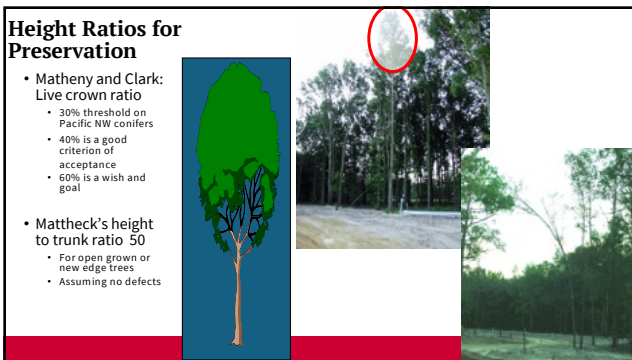
Pre-development Care and Preparation

- Define and mark protection zones
- Set up protection barriers
- Define and mark access corridors
- Mulch protection zone
- Prune deadwood
- Fertilize and irrigate as recommended by horticulturalist/arborist

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Height Ratios for Preservation

- Matheny and Clark: Live crown ratio
 - 30% threshold on Pacific NW conifers
 - 40% is a good criterion of acceptance
 - 60% is a wish and goal
- Mattheck's height to trunk ratio 50
 - For open grown or new edge trees
 - Assuming no defects



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Drip Line Method

- Simply assign the area based on the drip line or a multiple thereof



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Designing soil volumes based on whole-tree water demands: Forced space efficiency in root colonization

- Kopinga J. 1998. Suggested nitrogen mineralization capacity as method of assigning soil volume and the convergence with water capacity for soil requirements.
- Bakker C. 1983. 0.76 m³ per m² desired crown projection
- Lindsey/Bassuk 1991,1992. 0.61 m³ per m² desired crown projection (2cft/sqft)
- DeGaetano 2000. Adaptation of Lindsey/Bassuk model to daily climate inputs and irrigation scheduling for large containers

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Height Method

- An estimation of root zone size as a function of plant height
- For conifers and columnar tree canopies where drip line methods would underestimate the root zone requirement
- Minimizes fixed target establishment



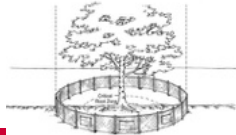
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Trunk Diameter Method

- For every inch of trunk measured 4.5 feet above the ground, allow 1 – 1.5 feet diameter for the protection zone

Table 6.2 Guidelines for optimal tree preservation zones for trees of average to excellent vigor (modified from the British Standards Institute 1991). Refer to Appendix B for species tolerance.

Species tolerance	Tree age	Distance from trunk feet (per inch trunk diameter)
Good	Young (<20% life expectancy)	0.5'
	Mature (20-80% life expectancy)	0.75'
	Overmature (>80% life expectancy)	1.0'
Moderate	Young	0.75'
	Mature	1.0'
	Overmature	1.25'
Poor	Young	1.0'
	Mature	1.25'
	Overmature	1.5'



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Providing Space Rather Than Keeping Cellulose Upright

- Protect groups of trees and soil space by rational traffic route delineation
- Losing one tree for construction effectiveness is worth the survival of several groups with space to grow
 - saving one tree at the cost of the remaining project is not helpful
 - If the tree has a value, put the loss directly into the landscape preservation budget
- Be sure the landscape crews do not cause damage during their access to the site
- Preservation does not end with the construction phase

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ALAS: Root zones are not circular like a drawing

- Determine the size of success
- Determine the soil situation
- Define the rooting depth of reasonableness
- Determine the soil volume needed
- Draw it as a semi-circle or a quarter circle
- Place your tree into it
- Adjust the arcs against the flat side to strengthen the distances perpendicular to the flat surface.



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Dead Trees Don't Flower

- Normal lifespan is species dependent
- Specific life expectancy is also site dependent
- Trees can be expensive to purchase
- Trees take time to reach "design size" and are expected to live long periods once established



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